

OCE 3014 Course Competencies Survey of Oceanography

Course Description: The ocean origin, physical properties, salinity, temperature, sound, radiative properties, heat budget and climatic controls, tides, wind-driven motion, monsoon circulation, el Nino phenomenon, subsurface water masses, oceanic circulation and paleoclimates.

This course is designed for upper level students pursuing a BS in Science Education.

3 Credits

Pre-requisites: GLY 1010

Co-requisites: OCE 3014L

Course competencies

Competency 1: Students will understand that the oceans are the single most dominant and distinctive feature on Earth and that they make our planet unique.

The student will be able to:

- a. Discuss how the oceans control Earth's climate making our planet fit for life.
- b. Describe how the bottom of the Ocean is constantly changing due the Plate Tectonics Cycle.
- c. Understand that Plate Tectonics makes our planet an unique place in the Solar System.
- d. Summarize the birth and death of an ocean basin.
- e. Analyze the chemical composition and physical properties of seawater.
- f. Summarize how the ocean provides a three dimensional habitat for a diversity of life forms.
- g. Evaluate how the Oceans provide humans with important economic resources.

Competency 2: The student will be able to describe the historical development of oceanography.

The student will be able to

- a. Discuss the development of Oceanography as a scientific discipline.
- b. Describe the role Foontaine Maury in the development of Physical Oceanography.
- c. List and describe the major branches of modern Oceanography.
- d. Name some modern research vessels and describe how each is used to explore the oceans.

Competency 3: The student will display an understanding of ocean bathymetry.

The student will be able to

- a. Locate and describe the features of continental margins.

- b. Differentiate between passive and active continental margins.
- c. Evaluate role of submarine canyons and turbidite currents.
- d. Locate and describe the various features of the ocean basins.
- e. Describe and give examples of deep-sea trenches and ocean ridges.
- f. Analyze the role of fracture zones and tectonic ridges.
- g. Describe volcanic activity within and along the margins of the ocean basins.
- h. Summarize the origin and evolution of seamount, guyots and atolls.
- i. Define salinity, explain how it is measured, and describe some conditions that cause it to vary.

Competency 4: The student will understand oceanic chemistry.

The student will be able to:

- a. Identify the major ions found in seawater
- b. Relate salinity to the relative amounts of these ions.
- c. Identify some substances that they can be removed from seawater.
- d. Map the temperature and density zones found in the oceans.
- e. Analyze nutrient, oxygen and carbon dioxide variations in the water column.

Competency 5: The student will understand biological oceanography.

The student will be able to:

- a. Evaluate the importance of microscopic plants and animals that live in the mixed layer.
- b. Describe the different life zones and most important marine ecosystems.

Competency 6: The student will display an understanding of ocean sediments.

The student will be able to:

- a. List direct and indirect methods of studying sea floor sediments
- b. Analyze information obtained from direct samples.
- c. Summarize the main families or groups of marine sediments.
- d. Name the most important groups of ooze-making organisms and give examples of each.
- e. Describe seafloor sediments and identify the sources of these sediments.

Competency 7: The student will display an understanding of the ocean/atmosphere interface.

The student will be able to:

- a. Evaluate the origin and role turbidites.
- b. Summarize the positions and physical characteristics of the troposphere, stratosphere, mesosphere, thermosphere, and ozone layers.
- c. Describe how convection cells in the atmosphere are created
- d. Measure how convection cells affect global climate and wind patterns.
- e. Given a weather map, locate warm, cold and stationary fronts, analyze the weather conditions around such fronts and predict the daily weather in those areas.

- f. Summarize the life cycle of a hurricane
- g. Evaluate the causes, effects, and socio-economic implications of the ENSO.

Competency 8: The student will be able to discuss oceanic circulation.

The student will be able to:

- a. Define ocean currents
- b. Map the general pattern of surface ocean currents.
- c. Define wind driven circulation
- d. Summarize how planetary wind patterns and the Coriolis force control surface ocean currents.
- e. Define Geostrophic flow and Western boundary effect.
- f. Define Thermohaline Circulation.
- g. Describe the major sources of deep-water.
- h. Evaluate ways in which density currents begin and why they are important.
- i. Summarize how upwelling occurs and why upwelling is essential to some marine ecosystems.